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ENCLOSURE 2

EXECUTIVE SUMMARY

St. Lucie Nuclear Plant, Units 1 and 2
NRC Inspection Report 50-335/96-13 and 50-389/96-13

This inspection included a review of the licensee's implementation of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants" [the Maintenance Rule]. The report covers a 1-week period of inspection by inspectors from Region II and the Office of Nuclear Reactor Regulation.

Operations

- Licensed operators, with some exceptions, understood their specific duties and responsibilities for implementing the Maintenance Rule. Two operators understanding of duties and responsibilities for implementation of the Rule was weak. Shift technical advisors were cognizant and knowledgeable of their roles associated with the Maintenance Rule (Section 04.1).

Maintenance

- Required structures, systems, and components, with the exception of three systems and radiation monitoring components were included within the scope of the Rule. A violation was identified for failure to include all structures, systems, and components within the scope of the Rule as required by 10 CFR 50.65 (b) (Section M1.1).

- Plans for performing the periodic evaluation met the requirements of the Rule. In addition, the quarterly report for structures, systems, and components performance was considered a positive indicator of the licensee implementation of an assessment process at a frequency exceeding requirements (Section M1.3).

- The approach to balancing reliability and unavailability was reasonable. However, the measure of reliability for risk significant systems did not meet the requirement of the Maintenance Rule. Thus, while the overall approach was acceptable, the implementation of this approach would not be achievable until such time as acceptable performance criteria for reliability of risk significant systems was developed (Section M1.4).

- The licensee had considered safety in establishment of goals and monitoring for Systems and Components reviewed, with the exception of a violation identified in Section M1.2 for failure to establish performance criteria commensurate with safety. Industry wide operating experience was used and corrective actions were appropriate. A violation was identified for failure to follow procedures associated with Rule implementation. Also, some weaknesses were identified. Examples were: failure to use vendor established acceptance criteria for verifying acceptable contact point resistance in the governor coil for the turbine pump on the Unit 1 'C' Auxiliary Feedwater train, untimely documentation of the cause determination for unit unplanned

unavailability, and implementation of licensee procedural requirements associated with the 4.16 Kilovolt breakers (Section 1M.6). The licensee had adequately addressed 10 CFR 50.63 Station Blackout Rule requirements and these requirements had been implemented into the Emergency Diesel Generator performance criteria (Section 1M.6).

- For most of the structures, systems, and components reviewed, performance criteria was established, industry-wide operating experience was considered, appropriate trending was being performed, and corrective action was taken when structures, systems, or components failed to meet performance criteria, or when a structure, system, or component experienced a maintenance preventable functional failure. Structures were being monitored and a systematic program for monitoring had been established. An item was identified for followup on licensee actions to provide performance criteria for structures after industry resolution of this issue. Several additional examples of the violation for failure to follow procedures associated with Rule implementation were identified. In addition, weaknesses were identified. Examples were: performance criteria did not clearly address all maintenance rule functions of the Reactor Protection System, several radiation monitors had not been included in the scope of the Rule, lack of clear definition of system boundaries associated with steam generator tubes, and numerous deficiencies in the way licensee personnel accomplished monitoring of systems and components to established performance criteria (Section M1.7).

  Issuance of the Maintenance Rule Administrator periodic memorandum, which provided an additional barrier to identify maintenance preventable functional failures was considered a strength (Section M1.7).

- Plant material condition observed during walkdowns was generally good. Preservation of equipment by painting was considered to be very good, considering the environment the plant is located in. One example of poor housekeeping (unattended step ladders) was observed in Unit 1 safety-related pump rooms (Section M2.1).

- The licensee's December 1995 assessment, and July 1996 audit provided significant insight, allowing corrective actions to be taken to institute an adequate program for compliance with 10 CFR 50.65. The assessment and audit provided meaningful feedback to management, and was considered a strength. However, this inspection determined the program was not functioning well, due in part to the short time it has been in place coupled with many new and inexperienced system engineers (system owners) who are not totally familiar with their systems or program requirements (Section M7.1).

Engineering

- The licensee's overall quantitative approach to perform risk ranking for structures, systems, and components in the scope of the Maintenance Rule using the probabilistic safety analysis approach was adequate. A violation was identified for failure to establish performance criteria

commensurate with safety. Other weaknesses noted included: ranking of initiating events and recovery actions not performed in a quantitative manner, re-ranking of structures, systems, and components following sensitivity study for unavailability not performed, approach for Bayesian updating for certain systems, structures, and components needed improvement, and expert panel guidance on assessing risk significance of shutdown conditions was weak (Section M1.2).

- The overall approach to assessing the impact before taking systems or components out of service was adequate. Weaknesses noted were: the exclusion of Mode 4 operations, lack of assessments for non-risk significant structures, systems, and component combinations, omissions from the pre-evaluated maintenance risk assessment matrix, and inconsistent interpretation of the definition of maintenance activities. The licensee's systematic approach to the development of the pre-evaluated maintenance risk assessment matrix was considered a strength (Section M1.5).

- The predictive maintenance program was being implemented in a manner which provided the licensee with analysis results to focus on problems prior to equipment failure. This area was considered a strength (Section E2.1).

- Most of the system engineers interviewed were newly assigned and lacked some system knowledge and historical information for their assigned systems. Although they understood specific requirements of the Maintenance Rule they did not always understand how to apply the rule to their systems. The fact that the licensee assigned systems engineers so late in the process for implementation of the rule is viewed as the major contributing factor to the deficiencies noted during this inspection. Four system engineers were knowledgeable of their systems and implementing the Rule requirements in a good manner (Section E4.1).

Report Details

Summary of Plant Status

Units 1 and 2 operated at power during the inspection period.

Introduction

The primary focus of this inspection was to verify that the licensee had implemented a maintenance monitoring program which met the requirements of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," (the Maintenance Rule). Inspection was performed by a team of inspectors that included a team leader and four Region II based inspectors, an inspector and a contractor from the Probablistic Safety Assessment Branch, Office of Nuclear Reactor Regulation, and three reactor engineers from the Quality Assurance and Maintenance Branch, Office of Nuclear Reactor Regulation. The licensee provided an overview presentation of the program to the team on the first day of the inspection. The overview handout is included as an attachment to this report.

I. OPERATIONS

04 Operator Knowledge and Performance

04.1 Operator Knowledge of Maintenance Rule

a. Inspection Scope (62706)

During the inspection, the team interviewed seven licensed operators and two shift technical advisors to determine if they understood the general requirements of the Maintenance Rule and their particular duties and responsibilities for its implementation.

b. Observations and Findings

The tasks associated with the Maintenance Rule that operators were responsible for included:

- Determining the impact on availability of Structures, Systems, and Components (SSC) when tagging equipment out-of-service and performing administrative requirements for tagging.
- Determining SSC out-of-service logging requirements and impact on availability.
- Evaluating priorities for system restoration.
- Evaluating job scheduling activities.
- Evaluating plant configuration to determine if work authorization created undue risk.

Most operators generally understood the purpose of the Rule and required duties for Rule implementation, which included logging in- and out-of-service equipment within the scope of the rule and assessing the risk of emergent work items in accordance with the plant configuration risk indicator matrix.

However, two operator's knowledge of the rule was very limited and did not indicate an understanding of the purpose of the rule nor any of the details of why the rule exists. Each of the operators had a very general knowledge of the rule and its implementation at the site. Training on the rule was very limited (approximately one hour during requalification) and was focussed mainly on the licensee's matrix for removal of equipment from service. There was also very limited knowledge on their specific duties and responsibilities for implementation of the rule. The matrix was not well understood by either operator; they were not aware of what systems were included under the rule, nor how to determine that information; they did not understand that they were an integral part in the logging of system unavailability for performance monitoring; and neither of them had read the procedure for implementation of the rule.

The two shift technical advisors interviewed were cognizant and knowledgeable of their roles associated with the Maintenance Rule. Their major task was to evaluate out of service equipment to a matrix. This matrix contained pre-evaluated (from the probabilistic risk assessment group) risk significant equipment out of service configurations.

c. Conclusions

Licensed operators, with some exceptions, understood their specific duties and responsibilities for implementing the Maintenance Rule. Two operators understanding of duties and responsibilities for implementation of the Rule was weak. Shift technical advisors were cognizant and knowledgeable of their roles associated with the Maintenance Rule.

II. MAINTENANCE

M1 Conduct of Maintenance

M1.1 Scope of Structures, Systems, and Components Included Within the Rule

a. Inspection Scope (62706)

Prior to the onsite inspection, the team reviewed the St. Lucie Final Safety Analysis Report, Licensee Event Reports, the Emergency Operating Procedures, previous NRC Inspection Reports, and other information provided by the licensee. The team selected an independent sample of structures, systems, and components that the team believed should be included within the scope of the rule, which was not classified as such

by the licensee. During the onsite portion of the inspection, the team used this list to determine if the licensee had adequately identified the structures, systems, and components that should be included in the scope of the rule in accordance with 10 CFR 50.65 (b).

b. Observations and Findings

The licensee appointed an expert panel to perform several maintenance rule implementation functions including establishing the scope of the Maintenance Rule. The panel reviewed 106 systems in the plant and determined that 72 were in the scope of the rule. In addition, 54 structures were placed within the scope of the rule.

The team reviewed the licensee's data base and verified that all required structures, systems, and components were included in the rule with the exception of the following:

- The licensee had not included the Post Accident Sampling System in the scope of the Maintenance Rule. Further review of this system determined that the system would be used during the performance of the sites Emergency Operating Procedures to aid in determination of offsite evacuation. Specific examples of this were found in the Emergency Operating Procedures for a Loss of Coolant Accident (EOP-03, Revision 14) and Steam Generator Tube Rupture (EOP-04, Revision 12). This is contrary to 10 CFR 50.65, which requires inclusion of SSCs that mitigate the consequences of an accident and are included in plant EOPs. The licensee issued Condition Report 96-2278 during the inspection to re-evaluate this system for inclusion in the Maintenance Rule.

- The licensee had not included the site Communications System in the scope of the Maintenance Rule. Further review of this system determined that the system is used to mitigate the consequences of accidents or transients, and is vital in the proper performance of all Off-Normal and Emergency Operating Procedures. A specific reference to the use of the plants Communications System was found in the Station Blackout Cross-tie Emergency Operating Procedure (EOP-99, Revision 17). This is contrary to 10 CFR 50.65, which requires inclusion of SSCs that mitigate the consequences of an accident and are included in plant EOPs. The licensee issued Condition Report 96-2278 during the inspection to re-evaluate this system for inclusion in the Maintenance Rule.

- The licensee had not included the Service Air System in the scope of the Maintenance Rule. Review of operator logs determined that the Service Air System air compressors on Unit 1 had been cross-tied to the Instrument Air System on July 13, 1996 in support of plant shutdown conditions. The Instrument Air System is included under the scope of the rule. Discussion of this issue with licensee personnel determined that it was licensee policy to routinely cross-tie the Service Air System Compressors to the

Instrument Air System during outage conditions. Further investigation determined that this configuration could affect the operation of the safety-related Low Pressure Safety Injection System operating in the shutdown cooling mode. 10 CFR 50.65 requires inclusion of non-safety related systems whose failure could prevent safety related SSCs from fulfilling their safety function and therefore, the team considered the Service Air System compressors should be included in the scope of the rule. The licensee issued Condition Report 96-2278 during the inspection to re-evaluate this system for inclusion in the Maintenance Rule.

° The inspection team was aware of a history of problems with radiation monitors, and, as a result, a review of the Radiation Monitoring System for scoping within the Maintenance Rule was conducted, even though the Radiation Monitoring System was included in the rule by the licensee. This review resulted in the determination that the Main Steam Radiation Monitors had not been included in the scope of the Maintenance Rule, even though both the Main Steam System and the Radiation Monitoring System had been included in the rule. This deficiency was the result of the lack of specific definition of the boundaries between the two systems. Upon discovery of the deficiency the licensee issued Condition Report 96-2264. Preliminary investigation by the licensee also identified the fact that the Unit 1 Containment Air Radiation Monitors were also not included in the scope of the rule. The Main Steam Radiation Monitors are used to mitigate the consequences of an accident and are included in plant EOPs. A specific example of their use is in the Steam Generator Tube Rupture EOP (EOP-04, Revision 12). This is contrary to 10 CFR 50.65, which requires inclusion of SSCs that mitigate the consequences of an accident and are included in plant EOPs.

10 CFR 50.65 (b) establishes the scoping criteria for selection of safety related and non-safety related structures, systems, or components to be included within the Maintenance Rule program. Scoping criteria includes safety-related structures, systems, or components that are relied upon to remain functional during and following design basis events to ensure the integrity of the reactor coolant pressure boundary, the capability to shut down the reactor and maintain it in a safe shutdown condition, and the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure comparable to the 10 CFR part 100 guidelines; and non-safety related structures, systems, or components that are relied upon to mitigate accidents or transients or are used in the plant emergency operating procedures, or whose failure could prevent safety-related structures, systems, and components from fulfilling their safety-related function, or whose failure could cause a reactor scram or actuation of a safety-related system. The deficiencies concerning scoping discussed above are included as examples of a Violation of these requirements, and were identified as Violation 50-335, 389/96-13-01, (Failure to Include All Structures, Systems, and Components in the Scope of the Maintenance Rule as Required by 10 CFR 50.65 (b)).

c. Conclusions

Required structures, systems, and components, with the exception of three systems and radiation monitoring components were included within the scope of the Rule. A violation was identified for failure to include all structures, systems, and components within the scope of the Rule as required by 10 CFR 50.65 (b).

M1.2 Safety or Risk Determination

a. Inspection Scope (62706)

Paragraph (a)(1) of the rule requires that goals be commensurate with safety. Implementation of the rule using the guidance contained in NUMARC 93-01 requires that safety be taken into account when setting performance criteria and monitoring under (a)(2) of the rule. This safety consideration would then be used to determine if the SSCs should be monitored at the train or plant level. The team reviewed the methods that the licensee had established for making these required safety determinations. The team also reviewed the safety determinations that were make for the systems that were reviewed in detail during this inspection.

b. Observations and Findings

In addition to determining which SSCs were within the scope of the rule, the licensee's expert panel established the risk significance ranking of SSCs, performance criteria of SSCs, goals for SSCs, (a)(1), and (a)(2) lists. PSL established the expert panel in accordance with Section 9.3.1 of NUMARC 93-01. The expert panel membership included representatives from operations, maintenance planning, reliability engineering, plant engineering, design engineering, and quality assurance.

The final risk significance ranking was based on a combination of results from a probabilistic risk assessment and expert panel judgement based on deterministic considerations. PSL used quantitative measures of risk achievement worth, risk reduction worth, and core damage frequency contribution which were consistent with the guidance provided in NUMARC 93-01. The risk metric which was used was based on core damage frequency (Level 1 analysis). The expert panel removed one SSC from the list of SSCs which had met at least one of the quantitative criteria. The Turbine Building Switchgear HVAC had originally met the quantitative criteria for risk significance. However, the expert panel had determined that conservative PSA modelling assumptions had been the primary determinant of the risk significance. Based on this reasoning, the expert panel determined that this system would be placed in the non-risk significant category. The team concurred with the expert panel's reasoning. Additionally, the expert panel added several SSCs to the risk significant list to accommodate PSA modelling limitations. The Fuel and CEAs, Containment Vessel and Penetrations, Shield Building, and Containment Spray and Cooling fans were added. At the time of the

inspection, the expert panel had declared 31 SSCs to be risk significant out of the 83 SSCs within the scope of the rule. PSL classified systems as risk significant if the system included a component that was necessary to support a risk significant function or if the system included a component which met any of the quantitative criteria. The team did not identify any SSCs that had been inappropriately ranked.

b.1 Risk Ranking

The team reviewed a sample of SSCs covered by the rule that the expert panel had categorized as non-risk significant to assess if the expert panel had adequately established the safety significance of those SSCs.

The team determined that the licensee had not included a consideration of initiating events or select recovery actions in the ranking process. The licensee indicated that they believed that the analytical validity of ranking initiating events was questionable, particularly from the perspective of risk achievement worth where the ranking process may lead to a decrease in the frequency of the event. (i.e. RAW rankings require setting the basic event probability to a value of 1.0, some initiators have frequencies greater than this value.) The inspectors concurred that the RAW rankings might be of limited value; however, RRW measures could provide some meaningful input. While the team did not identify any particular initiators which had not been adequately dispositioned by the expert panel, it was determined that the lack of inclusion of the initiators and the select recovery actions in the ranking process represented a minor weakness.

The team also reviewed the truncation limits used during the risk ranking process. Truncation limits are imposed on PRA models in order to limit the size and complexity of the results to a manageable level. PSL used a truncation level of 1E-12 when quantifying their PSA. This was about seven orders of magnitude less than the overall core damage frequency estimate of 2.1E-5. The licensee's approach to truncation with respect to the risk ranking process was adequate.

Based on the review of the above sampled SSCs, it appeared that the licensee's process was adequate to perform the risk ranking for the Maintenance Rule.

b.2 Performance Criteria

The team reviewed the licensee's performance criteria to determine if the licensee had adequately set performance criteria under (a)(2) of the maintenance rule consistent with the assumptions used to establish the safety significance. Section 9.3.2 of NUMARC 93-01 recommends that risk significant SSC performance criteria be set to assure that the availability and reliability assumptions used in the risk determining analysis (i.e. PRA) are maintained. PSL elected to use performance criteria for unavailability and reliability different than what was used in the risk determination for many of the risk significant SSCs. The PSA used actual plant specific values for unavailability and

reliability. PSL selected a performance criterion of two maintenance preventable functional failures (MPFFs) per operating cycle for reliability for almost all risk significant SSCs and used somewhat higher unavailability criteria for a number of SSCs.

PSL performed a sensitivity analysis that demonstrated that the use of the unavailability performance criteria would not have had a significant impact on total CDF. (i.e. the use of the Maintenance Rule criteria would have resulted in an approximately 20 % increase in CDF if all of the SSCs were assumed to be simultaneously at the upper end of their allowable values). The inspectors noted that the licensee did not perform an additional risk ranking to determine that the overall ranking was not adversely affected by the new data. However, based on the final results, the inspectors did not determine that this would have resulted in any new SSCs being categorized as risk significant since (with the exception of Turbine Building HVAC) all of the PSA modelled systems had already been categorized as risk significant.

However, at the time of the inspection, PSL had not performed a similar analysis that demonstrated that the performance criteria used for reliability preserved the assumptions used in the PSA, or that the use of the criterion did not have an adverse impact on risk ranking. The inspectors noted that there was no relationship established between the criterion and the failure probability assumptions in the PSA since the number of function demands and/or equipment run time were not tracked. Thus, widely different actual SSC reliability estimates (probability of failure upon demand) could result from the same number of MPFFs in a given time period if the number of demands were different. This issue was identified as Violation 50-335, 389/96-13-02, (Failure to Establish Performance Criteria Commensurate with Safety).

Also, the licensee did not establish appropriate performance criteria for the Unit 2 to Unit 1 condensate cross-tie valves. These valves were categorized as risk significant by calculation PSL-1FJR-94-002, "Risk Significance Determinations of PSL Unit 1 Systems." These valves were considered part of the auxiliary feedwater system in the systems summary report, even though they contained a condensate system equipment number. The performance criteria for the auxiliary feedwater system did not include performance criteria, other than 2 MPFFs/18 month period, that would be germane to these cross-tie valves. However, the cross-tie valves were rarely operated and probably would not be used twice during any 18 month period. In addition, as previously discussed, MPFFs without correlation to the underlying assumptions used for risk ranking was inadequate. Consequently, this is another example of violation 50-335,389/96-13-02, (Failure to Establish Performance Criteria Commensurate with Safety).

b.3 Bayesian Updating

The inspectors noted that the licensee had used a Bayesian updating process to incorporate certain aspects of plant specific data into the PSA model. It was determined that while the licensee had used a

recognized methodology for performing such updating, the method which was used provided a very crude approximation of the results which would be achieved by more rigorous methods. The licensee had assumed lognormal prior distributions for the data to be updated using the Bayesian methodology. In order to perform the necessary calculations by hand, the licensee "fitted" a gamma distribution to the lognormal prior using a variation of the "method of moments." This process preserves the mean and variance of the prior distribution; however, significant distortions can result. This is illustrated by the licensee's updating of the frequency of the loss of turbine cooling water initiating event. The licensee's initial estimate for the frequency of losses of TCW was 2E-02/yr based on generic data (i.e. one occurrence every 50 years). An error factor of approximately 27 was used by the licensee to estimate the variance of the prior distribution. The licensee updated the prior distribution on the basis of no losses of TCW during approximately 18 years of plant operation. Using the method of moments approximation as described above, the licensee updated the generic data and obtained a new mean frequency for TCW losses of about 9.0E-04/yr (i.e. about one occurrence every 1000 years). More accurate approaches to updating generic data with plant specific information were available. Such approaches include approximations which preserve the desired probability intervals of the prior distribution, and numerical methods which solve the updating problem directly. Independent calculations by the inspectors using these alternative methods and the licensee's data yielded an updated estimate of the TCW frequency to be approximately 7E-03/yr (i.e. about seven occurrences every 1000 years). The licensee concurred that the method of moments approximation approach could yield potentially distorted results when updating lognormal distributions, particularly those with relatively large error factors. The licensee stated that a review of the Bayesian methodology and its effects on the risk ranking results would be conducted and that future updates would consider an improved methodology when appropriate. The team concluded that the licensee's method of updating using plant specific data represented a weakness in the overall risk ranking process.

b.4 Expert Panel

The team reviewed the licensee's process and procedures for establishment of an expert panel. It was determined that the licensee had established an expert panel in accordance with the guidance provided in NUMARC 93-01. The expert panel's responsibilities included the final authority for decisions regarding maintenance rule scope, risk significance, and performance criteria selection.

The team determined that the guidance used by the expert panel to assess the risk significance of SSCs which were outside the scope of the licensee's PSA was weak. In particular, very little guidance on assessing the risk associated with shutdown configurations was provided. Additionally, the results of previous expert panel deliberations were not available since documentation of the panel's meetings had only been retained beginning in August of 1996. Thus, it was difficult to assess the processes and criteria which had been used in previous

deliberations. The inspectors determined that a lack of a systematic process had occurred which may have limited the effectiveness of previous expert panel activities. However, it was noted that the licensee had addressed this issue in that they had implemented a Systems and Components Engineering Department Guideline, No. SCEG-004, Rev. 0 on August 22, 1996. This guideline formalized the requirements associated with the expert panel's activities.

c. Conclusions

Based on the review of the above sampled SSCs, it appeared that the licensee's approach was adequate to perform the risk ranking for the maintenance rule. The licensee's use of performance criteria for unavailability, although different from what was assumed in the PRA, did not adversely affect the total plant risk. The failure to perform an additional risk ranking using the maintenance rule performance criteria was considered to be a minor weakness. Additionally, the failure to include initiating events and select recovery actions in the ranking process and the licensee's approach to Bayesian updating were also considered to be weaknesses. However, the licensee was not able to demonstrate that their use of a standard performance criteria for reliability (i.e. 2 MPFFs per 18 month period) did not have an adverse affect on the risk ranking used to establish the safety significance of SSCs within the scope of the rule. The licensee's expert panel process was determined to be adequate with a weakness identified in the area of assessing the risk impact of SSCs which were not within the scope of the PSA.

M1.3 Periodic Evaluation

a. Inspection Scope (62706)

Paragraph (a)(3)of the Rule requires that performance and condition monitoring activities and associated goals and preventive maintenance activities be evaluated taking into account, where practical, industry-wide operating experience. This evaluation was required to be performed at least one time during each refueling cycle, not to exceed 24 months between evaluations. The team reviewed site procedure Nos. ADM-17.08, "Implementation of 10 CFR 50.66, The Maintenance Rule", ADM-17.03, "Operating Experience Feedback program" and SCEG-008, "Guidelines for Maintenance Rule Periodic Assessments" which implemented the licensee's commitments regarding periodic evaluations, and held discussions with the Maintenance Rule Administrator who was responsible for preparing Maintenance Rule periodic assessments. The team also reviewed the July 9, 1996, quarterly report.

b. Observations and Findings

On June 29, 1995, license amendments were issued to remove EDG accelerated testing and special reporting requirements from the Technical Specifications. The amendments required the implementation of an EDG maintenance program that complies with the requirements of

10 CFR 50.65 and Regulatory Guide 1.160 within 90 days. As a result, a commitment date of September 29, 1995 was established for Maintenance Rule implementation associated with the EDGs. Due to early implementation of the Maintenance Rule for the EDGs, a periodic assessment was being accomplished for the EDGs; however, was not completed prior to the end of the inspection. The remainder of the site Maintenance Rule program began implementation on July 10, 1996, in compliance with 10 CFR 50.65 and periodic assessments will be due next year shortly after July 10, 1997. Both Units will be performed concurrently at that time.

The licensee's process regarding periodic evaluations of the Maintenance Rule activities were as follows:

- Maintenance Rule Quarterly Report - A report which documents the results of structures, systems, and components (SSCs) performance, SSCs considered for goal setting and monitoring per section (a)(1) of the rule, as well as SSC degradations, trends and pertinent industry wide operating experience.

- Periodic Assessment - A higher-level, comprehensive evaluation performed annually at mid-year following Maintenance Rule implementation dates.

The inspector reviewed the licensees quarterly report dated July 9, 1996 for all SSCs. The Emergency Diesel Generator System was currently not meeting established performance criteria and selected components were placed in Maintenance Rule (a)(1) status for the following conditions:

- Unit 1&2 EDGs have experienced repetitive maintenance preventable functional failures due to the governors.

- Unit 1 B EDG had exceeded its performance criteria for unavailability hours and had exceeded trigger values prescribed by the Emergency Diesel Generator Reliability Program.

c. Conclusions

The licensee's procedures appeared to meet the requirements of the Rule. In addition, the quarterly report for SSC's performance was considered a positive indicator of the licensee implementation of an assessment process at a frequency exceeding requirements.

M1.4 Balancing Reliability and Unavailability

a. Inspection Scope (62706)

Paragraph (a)(3) of the rule also requires that adjustments be made where necessary to assure that the objective of preventing failures through the performance of preventive maintenance is appropriately balanced against the objective of minimizing unavailability due to monitoring or preventive maintenance. The inspectors met with the

St. Lucie Maintenance Rule Administrator for the purpose of determining the licensee's general methodology for balancing unavailability and reliability. The inspector also reviewed Systems and Components Engineering Department Guideline No. SCEG-007, GUIDELINE FOR PERFORMING CAUSE DETERMINATION AND MAINTENANCE RULE GOAL SETTING AND MONITORING ACTIVITIES, Revision 0. Attachment 1 to SCEG-007 provided a detailed description of the licensee's methodology to be used for balancing.

b. Observations and Findings

The team reviewed the licensee's process for balancing SSC reliability and unavailability. The requirements for balancing were contained in Administrative Procedure ADM-17.08, with additional guidelines provided in SCEG-007. The licensee's approach consisted of monitoring SSC performance against the established performance criteria. The process considered an SSC balanced if the performance criteria were met.

As noted in paragraph M1.2.b.2, the team concluded that the licensee's approach to establishing the performance criteria associated with equipment unavailability was adequate. However, the use of MPFFs alone does not give sufficient information about SSC reliability. Meaningful estimates of reliability would necessitate information that incorporated SSC demands and time in service.

c. Conclusions for Balancing Reliability and Unavailability

The team concluded that the licensee's proposed method of balancing reliability and unavailability would provide an acceptable approach. However, using MPFFs as the measure of reliability would not meet the intent of the Maintenance Rule. Thus, while the overall approach was acceptable, the implementation of this approach would not be achievable until such time as acceptable performance criteria for equipment reliability are developed.

M1.5 Plant Safety Assessments Before Taking Equipment Out of Service

a. Inspection Scope (62706)

Paragraph (a)(3) of the Maintenance Rule states that the total impact on plant safety should be taken into account before taking equipment out of service for monitoring or preventive maintenance. The team reviewed the licensee's procedures and discussed the process with the maintenance rule coordinator, the expert panel members, the plant operators, system schedulers, and work week supervisors.

b. Observations and Findings

The team reviewed the licensee's process and performance regarding their risk assessment of removing equipment from service. The inspectors identified several weaknesses.

PSL implemented the requirements to assess the impact on plant safety when removing equipment from service into Operating Procedure No. 0010129, "Equipment Out of Service", Rev. 30. The procedure referenced the use of a pre-evaluated maintenance risk assessment matrix (PREMRA Matrix) that identified combinations of risk significant equipment that were proposed to be removed from service. The matrix contained various equipment maintenance configurations which had been quantitatively evaluated (by the licensee's PSA organization) and addressed operations during Modes 1, 2, and 3. The PREMRA matrix was used by work planning personnel to ensure that the proposed scheduled maintenance had been previously evaluated to be acceptable from a risk management perspective. The risk matrix was deficient because it did not include all of the risk significant systems identified in the licensee's maintenance rule program. Further, the matrix did not explicitly address the additional risks which could be incurred when conducting maintenance associated with non-risk significant equipment. Combinations of low risk SSCs removed from service may place the plant in a risk significant configuration. (The PREMRA matrix covered only combinations of risk significant equipment.) Finally, based on discussions with the planning group and operations personnel, it was determined that an inconsistent interpretation of the definition of "maintenance" existed between the various groups. The PREMRA matrix was developed with the intention that all maintenance (including surveillance, testing, and monitoring activities) would be considered when evaluating the various configurations. (Such a definition is consistent with the NUMARC 93-01 guidance.) The operations and planning staff had interpreted maintenance as only those activities which actually removed the equipment from service. This inconsistent application of the interpretation of "maintenance" from a risk perspective was considered to be a weakness in the implementation of the matrix. The licensee concurred that these weaknesses existed in the PREMRA matrix approach and indicated that enhancements were warranted in these areas.

The licensee implemented a separate shutdown safety assessment (SSA) process for Modes 5 and 6. The SSA took into account the need to maintain certain critical safety functions during shutdown operations. These functions included reactivity control, electrical power, inventory control, containment integrity, core cooling, RCS pressure control, and fuel pool cooling. However, the licensee had not implemented systematic approach to assessing the impact of maintenance activities during Mode 4 operations. The inspectors determined that the failure to explicitly consider Mode 4 was a weakness in the licensee's approach to assessing the impact of maintenance activities. The licensee concurred that a need to assess Mode 4 operations existed and implemented an interim approach based on the approach defined in Administrative Procedure No. 0010460, "Critical Maintenance Management". The licensee indicated that alternative approaches to assessing the risks of maintenance activities during Mode 4 operation would be developed.

The inspectors noted that guidance was provided which directed the operations/planning staff to contact the PSA group prior to entering

configurations (for risk significant SSCs) not specifically addressed by the PREMRA matrix. Additionally, this guidance was also applicable to emergent maintenance which exceeded the scope of the preanalyzed configurations.

The inspectors identified an area of strength in the risk assessment of plant configurations. It was determined that the licensee had conducted extensive calculations to support the PREMRA matrix approach. The inspectors were unable to perform direct independent verification of the calculations; however, it was noted that the licensee had conducted an appropriate level of review. The inspectors reviewed a sample of previous plant configurations since the implementation date of the maintenance rule did not identify periods where the plant was operating in a high risk configuration.

c. Conclusions

The team identified several process and performance weaknesses regarding the licensee's assessment of the safety impact of removing SSCs from service for monitoring and preventive maintenance. The exclusion of Mode 4 operations, lack of assessments for non-risk significant SSC combinations, omissions from the PREMRA matrix, and inconsistent interpretation of the definition of maintenance activities were examples of these weaknesses.

The licensee's systematic approach to the development of the PREMRA matrix was considered a strength. The overall approach to assessing the risk impact of maintenance activities was considered adequate.

M1.6 Goal Setting and Monitoring for (a)(1) SSCs

a. Inspection Scope (62706)

Paragraph (a)(1) of the Rule requires, in part, that licensees shall monitor the performance or condition of structures, systems, or components against licensee-established goals, in a manner sufficient to provide reasonable assurance the SSCs are capable of fulfilling their intended functions. The Rule further requires goals to be established commensurate with safety and industry-wide operating experience be taken into account, where practical. Also, when the performance or condition of the SSC does not meet established goals, appropriate corrective action shall be taken.

The team reviewed the systems and components listed below which the licensee had established goals for monitoring of performance to provide reasonable assurance the system or components were capable of fulfilling their intended function. The team verified that industry-wide operating experience was considered, where practical, that appropriate monitoring was being performed, and that corrective action was taken when structures, systems, or components failed to meet goal(s), or when a structure, system, or component experienced a maintenance preventable functional failure.

The team reviewed program documents and records for the six systems or components the licensee had placed in the (a)(1) category in order to evaluate this area. The inspectors also discussed the program with the Maintenance Rule Administrator, system engineers, and other licensee personnel.

b. Observations and Findings

b.1 Emergency Diesel Generator Governors and the 1B2 Emergency Diesel Generator

The inspector verified that the licensee had implemented goal setting and monitoring as required by paragraph (a)(1) of the rule for Emergency Diesel Generator (EDG) 1B2 and all EDG Governors. The 1B2 EDG on Unit 1 had exceeded its performance criteria for unavailability hours and had exceeded trigger values prescribed by the Emergency Diesel Generator Reliability Program and is classified as (a)(1) equipment. The remaining three EDGs were classified as (a)(2) equipment. The EDG Governors on Unit 1 and 2 had experienced repetitive MPFFs and were classified as (a)(1) equipment.

The licensee elected early implementation of the Maintenance Rule for EDGs and associated support equipment. This was accomplished by implementing the provisions of the Maintenance Rule and Regulatory Guide 1.160 for these SSCs prior to July 10, 1996. The inspectors determined that the licensee has considered safety in establishment of monitoring and goals for these SSCs. Corrective actions are appropriate. Maintenance and the System Engineer were knowledgeable of assigned systems and were proactive in development and implementation of corrective actions. The System Engineer had actively participated in establishment of performance criteria and goals for the EDGs and EDG Governors.

Additionally, the inspector determined that the licensee had adequately addressed 10 CFR 50.63 Station Blackout Rule requirements and that these requirements had been implemented into the EDG performance criteria. The licensee had committed to a target EDG reliability value of 0.975 which was used as a basis for performance criteria for EDG reliability under the Maintenance Rule. Target reliability values for EDG start demands were also incorporated into the EDG performance criteria.

b.2 Unit 1 Power Operated Relief Valves (PORVs)

The licensee had experienced two Maintenance Preventable Functional Failures (MPFFs) on the Unit 1 Pressurizer PORVs in August 1995, which resulted in the valves being inoperable for a period of nine months (Reference LER 95-05). As a result of these failures and the PORV unplanned unavailability associated with these failures, the licensee had put the Unit 1 PORVs in (a)(1) status. The inspector reviewed the corrective action for these failures, and the goals and monitoring under the (a)(1) status, and concluded that the corrective action, goals, and monitoring were appropriate.

During the review of the PORVs, the inspector noted that the plant performance criteria for unit unplanned unavailability had been exceeded due to Reactor Coolant System deficiencies. The licensee was questioned concerning this issue, and it was determined that a cause determination for exceeding this criteria had not been performed in accordance with Licensee procedure ADM 17.08, Revision 7, paragraph 7.8.1.B. Further investigation determined that a condition report (96-2037) had been issued with regard to exceeding this criteria, but had not been resolved. The licensee completed resolution of this condition report during the inspection. The untimely documentation of the cause determination for exceeding the unit unplanned unavailability was considered a weakness in the implementation of the licensee's Maintenance Rule program.

b.3 4.16 KV Switchgear and Breakers

The licensee had experienced several repeat Maintenance Preventable Functional Failures (MPFFs) involving failure of 4.16 KV Breakers due to floor tripper and latch switch misadjustments. As a result of these failures the licensee had put these breakers in the Maintenance Rule (a)(1) category. The inspector reviewed the corrective action for these failures, and the goals and monitoring under the (a)(1) status, and concluded that the corrective action, goals, and monitoring were appropriate. The inspector also reviewed additional work order data concerning performance of these breakers for the period January 1995 to the beginning of the inspection. This review determined that there were two additional repeat MPFFs, and a significant number of breaker unavailability hours, which had not been identified in the licensee's Maintenance Rule Quarterly Report as follows:

- Work Orders 95007753-01 and 95007984-01 performed preventive maintenance on the 4.16 KV Station Blackout Cross-tie Breakers, and no unavailability of these breakers was trended against the unavailability performance criteria for these breakers in the licensee's Maintenance Rule Quarterly report dated July 9, 1996.

- WOs 95021809-01 and 95023498-01 reported repetitive maintenance preventable functional failures for the 4.16 KV breakers for the pressurizer heater electrical supply which were not shown in the licensee's Maintenance Rule Quarterly report dated July 9, 1996.

This was contrary to licensee procedure ADM 17.08, Revision 7, paragraph 7.6.4 and 7.11.2.A, which require performance monitoring be accomplished by tracking specific (SSC Level) and/or Plant Level Performance Criteria and repetitive maintenance preventable functional failures, and the documentation of this information the licensee's Maintenance Rule Quarterly Reports. Failure to track repeat MPFFs and SBO breaker unavailability hours against their performance criteria were identified as examples of Violation 50-335, 389/96-13-03, (Failure to Follow Procedures for Implementation of the Maintenance Rule).

b.4 Unit 1 'C' Auxiliary Feedwater Train

The Unit 1 'C' AFW train exceeded its performance criteria for reliability when it experienced three MPFFS in an 18 month period. The primary cause of the MPFFs was due to corrosion on electrical contact surfaces in the turbine pump governor coil and a motor operator valve (MOV)(SMB-000) torque switch. As corrective action the licensee upgraded the SMB-000 actuator and the Unit 1 turbine governor coil resistance PMs from a 18 month frequency to a 6 month frequency, and required that as-found and as-left resistance checks be performed. The reliability criteria was also changed from ≤ 2MPFFs/train per 18 months, to no SBM-000 actuator contactor failures after the new PMs were implemented, and no as-found, out of specification resistance checks for the next 18 months. The team noted however, the goals established by the licensee had no basis for the acceptance criteria established for the resistance checks. The system engineer had elected to establish a starting point for monitoring resistance of one hundred OHMs resistance for the governor coil and adjust the acceptance criteria after monitoring the PM values for 18 months. This seemed satisfactory to him because the as-found, failed condition of the governor coil was one thousand OHMs. The torque switch resistance check start point was set at two hundred Milli-OHMs per instructions from a electrical engineer. The inspectors noted that the value given for the turbine governor coil resistance checks in the technical manual was 35 OHMs. The team considered the technical manual values should have been used when establishing preliminary acceptance criteria for taking resistance readings and additional points could be obtained by taking measurements on in-house spares and/or values established by industry using industry operating experience. The system engineer could still monitor deviations from this norm to align the criteria for the environmental conditions at the St. Lucie Plant. As a result of questioning the acceptance criteria, the system engineer contacted an electrical engineer who advised the system engineer to use resistance check criteria within 125% of the 35 OHMs recommended in the vendor technical manual. The system engineer informed the inspectors that this value would be used. The team considered the licensee's not considering acceptance criteria recommended in the vendor technical manual when setting initial goals to be a weakness.

b.5 Reactor Coolant Pump Seals

The Unit 1 and Unit 2 Reactor Coolant Pump (RCP) Seals were a large contribution to exceeding the plant level unavailability criteria when 1A2 RCP seal failed in August 1995, and in April 1996, and the 2A2 RCP experienced a failure in September 1995. However, the RCP seals in themselves did not lead directly to the performance criteria being exceeded. The licensee's expert panel elected as a conservative entry to put the RCP seals into category (a)(1) in order to establish realistic goals and closely monitor the performance of a risk significant component. The inspectors interviewed the system engineer for the Reactor Coolant System and noted this engineer keep a very good notebook on his system. The notebook included trending data on each

pump to determine appropriate RCP seal life. Other data requested during the interview was also well documented in the notebook. The inspectors attended a management training meeting on the RCP seals, reviewed expert panel meeting minutes on the RCP seals, and reviewed corrective action documents including STAR 1-950988, Problem Report 95-017, Condition Report 96-598, and RCP 1A2 Seal Root Cause Analysis dated August 25, 1993. The inspectors also reviewed the corrective action taken by the licensee as well as the goals set to improve the performance of the RCP seals, which included increasing the frequency for changing the RCP seals every two cycles. In addition, the licensee has scheduled installation of an enhanced (N9000 Series) seal for one RCP pump during the next outage to evaluate its performance with the intention of going to this seal if upgraded performance can be established.

c. Conclusions

The licensee had considered safety in establishment of goals and monitoring for systems and components reviewed with the exception of the violation identified in Section M1.2 for failure to establish performance criteria commensurate with safety. Industry wide operating experience was used and corrective actions were appropriate. However, some weaknesses were identified. Examples were: failure to use vendor established acceptance criteria for verifying acceptable contact point resistance in the governor coil for the turbine pump on the Unit 1 'C' AFW train, untimely documentation of the cause determination for unit unplanned unavailability, and implementation of licensee procedural requirements associated with the 4.16 KV breakers. A violation was identified for Failure to follow procedures associated with Rule implementation.

The licensee had adequately addressed 10 CFR 50.63 Station Blackout Rule requirements and these requirements had been implemented into the EDG performance criteria.

M1.7 Preventative Maintenance and Trending for (a)(2) SSCs

a. Inspection Scope (62706)

Paragraph (a)(2) of the Rule states that monitoring as required in paragraph (a)(1) is not required where it has been demonstrated that the performance or condition of a SSC is being effectively controlled through the performance of appropriate preventative maintenance, such that the SSC remains capable of performing its intended function.

The team reviewed selected SCCs listed below for which the licensee had established performance criteria, and was trending performance to verify that appropriate preventative maintenance was being performed, such that the SSCs remain capable of performing their intended function. The team verified that industry-wide operating experience was considered, where practical, that appropriate trending was being performed, that safety was considered when performance criteria was established, and that

corrective action was taken when structures, systems, or components failed to meet performance criteria, or when a structure, system, or component experienced a maintenance preventable functional failure.

The team reviewed program documents and records for selected structures, systems, and components the licensee had placed in the (a)(2) category in order to evaluate this area. The inspectors also discussed the program with the Maintenance Rule Administrator, system engineers, maintenance supervisors, and other licensee personnel. In addition, the team reviewed specific program areas based on review of operator logs and equipment out of service logs.

b. Observations and Findings

b.1 Structures

Based on interviews with the cognizant engineer within the licensee's civil engineering organization and review of the following implementing procedures: ADM-17.08 (Implementation of 10 CFR 50.65, The Maintenance Rule), Scoping Document for the Implementation of the Maintenance Rule for Monitoring the Effectiveness of Maintenance on Structures (Revision 2), SCEG-003 Rev. 1 (Guideline for the Condition Survey of Structures and Supports by Plant Personnel), and SCEG-009 Revision 0 (Guideline for Maintenance Rule Structural Condition Monitoring by a Qualified Inspector), the team concluded that the licensee had selected the correct structures to be monitored under the Maintenance Rule and had established a systematic program for monitoring the condition of these structures. The licensee has begun the initial baseline survey of structures which to date has consisted of the Unit 1 refueling water storage tank and the Unit 1 intake structure and retaining walls. All baseline inspections are to be completed by December 31, 1997. Periodic surveys will then be performed throughout the life of the plant at intervals not to exceed five years. The inspection attributes used in the walkdowns for baseline inspections and the periodic surveys of structures were based on applicable design criteria as implemented in the above procedures using surveillance check sheets. Significant discrepancies identified during walkdown down inspections were identified in condition reports and photographs were taken of the findings in order that comparisons can be made of discrepant conditions during subsequent inspections. The licensee used knowledgeable and experienced civil engineers to perform the structural inspections. A review of the licensee's baseline inspection for the Unit 1 intake structure revealed that a CR for intake structure listed 15 different line items of discrepancies for this structure. Photographs of the discrepancies revealed cracks and segregations. The team determined that the licensee had not established performance criteria for moving a structure from the (a)(2) category and placing it in the (a)(1) category. The inspectors questioned the civil engineer regarding what degradation would have to occur before the intake structure would be placed in the (a)(1) category? The engineer stated that, although there was no specific criteria, he would probably place this structure in (a)(1) the next interval inspection if degradation continued. The

engineer also stated that, he would revise his structural procedure to set performance criteria for (a)(2) structures. The issue of no performance criteria for structures is a industry wide problem and has been identified before by NRC. The reason for the problem is that there is presently no industry guidance in this area. Inspector Followup Item No. 50-335, 389/96-13-04 was identified (Followup on Licensee Actions to Provide Performance Criteria for Structures After Industry Resolution of this Issue).

b.2 Main Steam System - Steam Generator Tubes

The main steam system was reviewed by the team to determine why the Unit 1 steam generators were in (a)(2) and not (a)(1) when they had caused a 40 day extension of the July 1996 outage, and were scheduled to be replaced next refueling outage. The licensee's position for the steam generators not being in (a)(1) was that the major tube degradation that they are finding now was caused by secondary cooling water chemistry problems during initial startup. This problem was corrected several years before the 3 year historical review required by the Rule and no other corrective action can be taken at this point that is not already being taken to address this problem. Therefore, the licensee contended that further tube degradation is not maintenance preventable, but caused by the design of their steam generator support plates. Industry reviews were ongoing to support this theory. The team considered that sufficient historical data of degraded tubes existed for these components to be considered for placement in (a)(1) category. The licensee had initiated efforts to improve secondary water chemistry, and also stated that the Unit 1 steam generators are tentatively scheduled to be replaced during the next refueling outage. However, the team considered not placing the Unit 1 steam generator tubes in the (a)(1) category until the steam generator replacement outage was a weakness.

The inspectors interviewed the Main Steam System engineer, to obtain information on tube failures and the status of eddy current examinations and subsequent plugging activities. The inspectors were informed that the system engineer for the Main Steam System has held the job for less than two months and although, the steam generators are listed as the major component in the Main Steam System, the risk significant portion of the steam generators and associated Maintenance Rules functions derived from the Technical Specifications are listed under the Reactor Coolant System. Neither the Main Steam nor the Reactor Coolant system engineer knew they had the steam generator tubes. However, both engineers had a basic understanding of the Maintenance Rule. During subsequent discussions, the Maintenance Rule Administrator stated that he considered as least the primary side and possibly the entire steam generator and should be under the Reactor Coolant System and that he intended to change the program to reflect this. The team considered this lack of clear definition of system boundaries to be a weakness in the licensee's program.

b.3 Turbine Cooling Water System

The licensee had experienced two failures in the Turbine Cooling Water (TCW) System on Unit 2, which caused manual reactor trips during the first six months of 1996. This was below the performance criteria (less than or equal to two failures causing manual reactor trips within the past twelve months) established by the licensee in order to keep the system in Maintenance Rule category (a)(2). However, the team determined that this criteria had no technical basis as discussed in paragraph M1.2. Even though the TCW System had been classified as (a)(2), the system had been reported to management as a system requiring "heightened awareness" in the Maintenance Rule Quarterly Report dated July 9, 1996. Review of the TCW failures determined that they were caused by the failure of the same temperature control valve (TCV-13-15), but the failures were due to two different causes (one failure involving electrical logic and one failure involving disconnect of the operator actuator feedback arm from the valve). The inspector reviewed the work order history for valve TCV-13-15 during the previous twelve months, and no additional failures of the valve were found. In addition, the inspector reviewed the corrective action for these two failures. The inspector determined that corrective action was appropriate with the one exception: The corrective action for the actuator arm failure had considered similar valves in the TCW system for both units; however, it had not considered similar valves in other plant systems. This is contrary to licensee procedure ADM 17.08, Revision 7, paragraph 7.8.4, which requires that cause determinations for failures shall consider any generic implications for structures, systems and components other than the one being evaluated. The licensee issued Plant Managers Action Item (PMAI) 96-09-210 when advised of this deficiency. Failure to consider the generic implications of a Maintenance Preventable Functional Failure was included as an example of a Violation 50-335, 389/96-13-03, Failure to Follow Procedures for Implementation of the Maintenance Rule.

b.4 Main Feedwater System

Review of the Main Feedwater System determined that appropriate performance criteria had been established and monitoring was being accomplished against those criteria. Review of the problems associated with the system determined that appropriate corrective actions had been taken for failures. Operating experience was being used in system monitoring. No deficiencies were noted concerning this system.

b.5 Nuclear Instrumentation, Control Element Drive System, Reactor Protection System, Radiation Monitoring, and Emergency Diesel Generators 1A1, 1A2, 1B1

The team reviewed other systems containing SSCs that were considered as within the scope of the Maintenance Rule but were not monitored under paragraph (a)(1) of the rule. These systems or components included Nuclear Instrumentation, Control Element Drive System (CEDM), Reactor Protection System (RPS), Radiation Monitoring, EDG 1A1, EDG 1A2, and EDG 1B1.

In most cases these systems were monitored using system or train performance criteria which is reasonable and PSA based. However the inspector noted that the RPS performance criteria developed by the licensee did not clearly address all maintenance rule functions of the Reactor Protection System. Specifically, the performance criteria could be inconsistently applied as related to the Reactor Protection System Trip Circuit Breakers (TCB) or associated Reactor Protection System Logic Relays. Although a TCB failure which had occurred during 1994 had been classified as a functional failure, system engineering personnel informed the inspectors that a TCB failure would not be a functional failure. The inspectors discussed this concern with the Maintenance Rule Administrator and were informed that additional performance criteria would be established that would allow more consistent application. Condition Report 96-2296 was issued by the licensee to document this problem.

Additionally, the team determined that the licensee had failed to include the Unit 1 and 2 Main Steam Line Radiation Monitors, RE-26-62, RE-26-63, RE-26-71, RE-26-72, and RE-26-73, as SSCs under the scope of the Maintenance Rule. As the result of this oversight the licensee issued Condition Report 96-2264. The inspector reviewed this CR and noted that proposed corrective actions included an additional licensee review to ensure that other radiation monitors had not been missed. The inspectors were subsequently informed by the licensee that as the result of this ongoing review, the Unit 1 Containment Air Monitors, RE-26-31 and RE-26-32, were identified as additional radiation monitors which had also not been included under the scope of the rule. Regulatory aspects of this issue are addressed in Section M1.1.

b.6 Unavailability

The licensee's general implementation direction to meet this requirement was contained in Administrative Procedure ADM 17.08, "Implementation of 10 CFR 50.65, The Maintenance Rule." Performance criteria was established for all SSCs to set a standard for adequate performance with the performance criteria for each system documented as part of Appendix B to ADM 17.08. Section 7.6.4 of the ADM required, in part, that "Performance monitoring shall be accomplished by tracking Specific (SSC Level) and/or Plant Level Performance Criteria and repetitive maintenance preventable functional failures..." Section 4.4.3 of the ADM stated that the "System owners are responsible for monitoring systems, structures and components for compliance to performance criteria." Further guidance on performance monitoring was provided in Systems and Components Engineering Guideline No. SCEG-006, "Guideline for Monitoring Maintenance Effectiveness by Maintenance Rule System Owners." Section 7.3.1.A directed system owners to use the Equipment Out of Service Log to determine the out of service hours.

Appendix B of ADM 17.08 identified the Chemical and Volume Control and Containment Spray Systems as risk significant with specific availability performance for Containment Spray trains A/B and Chemical and Volume

Control charging pumps A/B/C. The specific unavailability hours were contained in the quarterly system summaries report.

The inspector reviewed selected Equipment Out of Service Logs and determined unavailability hours tracked by the system owner associated with the Unit 1 and Unit 2 Chemical and Volume Control Systems were not accurate. Specifically, the unavailability hours did not include:

- Five hours six minutes on July 10 when the 2A charging pump was out of service
- One hundred twenty nine hours 25 minutes between July 22nd and July 27th when the 1A charging pump was out of service
- Eighty hours thirteen minutes between July 13th and July 17th when the 2A charging pump was out of service
- Ten hours more than were recorded when the 2A charging pump was out of service between August 5th and August 8th.

As determined through interview, the system owner was using the working equipment clearance order log to ascertain when the charging pumps were out of service. If identified in the log the specific equipment out of service log entry would be reviewed to determine the actual time the pump was unavailable. However, this clearance log did not include all of the equipment out of service entries.

The unavailability hours tracked by the system owner associated with the Unit 2 Containment Spray System for August 1996 were not accurate. Specifically, unavailability hours for the hydrazine pump were not included as part of the hours. The hydrazine pump was considered part of a containment spray train per interview with the Maintenance Rule Administrator and identified as a key component in the system summary for the Containment Spray System. Based upon interview, the system owner did not know the hydrazine pump was included in the train. Therefore, the tracked unavailability hours did not include 12 hours 55 minutes between August 6th and August 7th, or 17 hours 12 minutes on August 18th when the 2A hydrazine pump was out of service.

Failure to track equipment out of service for comparison to performance criteria as required by procedure was identified as an example of Violation 50-335, 389/96-13-03, (Failure to Follow Procedures for Implementation of the Maintenance Rule).

Also, the Containment Spray System owner had yet to include the times a Containment Spray train was out of service for testing in August. Due to section 4.10 of the Equipment Out of Service Procedure, 0010129, equipment removed from service for Technical Specification surveillances need not be logged in the Equipment Out of Service Log, provided the equipment did not fail the surveillance. Therefore, there was a weakness in the written direction for determining out of service hours. While being interviewed, the system owner stated that he recently

acquired the ability to read the chronological logs on his computer and was beginning to review the present quarter's chronological logs for out of service times in addition to the Equipment Out of Service Log. Therefore, the inspector concluded that the missed times in August would have been identified for inclusion in the quarterly system summaries report that includes cumulative out of service times.

b.7 Maintenance Preventable Functional Failures

ADM 17.08 designated other performance criteria besides unavailability for monitoring risk significant equipment, such as MPFFs. Monitoring of MPFFs was discussed in section 4.4.4 of ADM 17.08 which stated "System owners are responsible for identifying potential maintenance preventable Functional Failures and bringing them to the attention of Management and the MRA via the Condition Report Process." Section 7.8 further required that a functional failure of a risk significant structure, system, or component, even if the goal or performance criteria was met, would receive a cause determination which would be documented as a Condition Report.

The inspector requested the Condition Reports for several potential MPFFs identified through review of the Equipment Out of Service and unit specific chronological logs. Reports were provided for all but the unexpected tripping of the 1A Boric Acid Makeup pump on July 25, 1996. Consequently, Condition Report 96-2293 was initiated on September 19th. Failure of the system owner to initiate a Condition Report prior to inspector involvement was identified as an example of Violation 50-335, 389/96-13-03, (Failure to Follow Procedures for Implementation of the Maintenance Rule).

b.8 Maintenance Rule Administrator Memorandum

The inspector identified a strength in the form of a periodic memorandum to the system owners from the Maintenance Rule Administrator. The memorandum highlighted equipment failures for consideration as maintenance preventable and requested the applicable system owners to ensure these failures were reviewed. Nothing within the licensee's prescribed program mandated this memorandum but, it did provide an additional barrier to ensure MPFFs were identified.

c. Conclusions

Performance criteria was established, industry-wide operating experience was considered, where practical, appropriate trending was being performed, and corrective action was taken when structures, systems, or components failed to meet performance criteria, or when a structure, system, or component experienced a maintenance preventable functional failure for most of the structures, systems, and components reviewed. Structures were being monitored and a systematic program for monitoring had been established. An Inspector Followup Item was identified for followup on licensee actions to provide performance criteria for structures after industry resolution of this issue. Several examples of

a violation for failure to follow procedure for implementation or the Maintenance Rule was identified. In addition, weaknesses were identified. Examples were: performance criteria did not clearly address all maintenance rule functions of the Reactor Protection System, several radiation monitors had not been included in the scope of the Rule, lack of clear definition of system boundaries associated with steam generator tubes, and numerous deficiencies in the way licensee personnel accomplished monitoring of systems and components to established performance criteria.

Issuance of the Maintenance Rule Administrator periodic memorandum, which provided an additional barrier to identify maintenance preventable functional failures was considered a strength.

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 Material Condition Walkdowns

a. Inspection Scope (62706)

During the course of the reviews, the inspectors performed walkdowns of the following systems and plant areas, and observed the material condition of these SSCs.

- Emergency Diesel Generators
- Nuclear Instrumentation
- Control Element Drive System
- Reactor Protection System
- Radiation Monitoring
- Auxiliary Feedwater System
- Unit 1 Safety-Related Pump Rooms
- Structures
- Turbine Cooling Water
- Main Steam
- Main Feedwater
- Other Balance of Plant Areas

b. Observations and Findings

The inspectors performed material condition walkdowns on selected portions of each system that related to the areas inspected. Housekeeping in the general areas around system and components was acceptable. Piping and components were painted, and very few indications of corrosion, oil leaks, or water leaks were evident. The inspector observed the inside of selected panels and cabinets and no loose debris, damage, or degraded equipment was noted. During walkdowns of safety-related pumprooms on Unit 1, the inspectors observed step ladders in the vicinity of the pumps in two rooms (High Pressure Safety Injection Safeguards and Low Pressure Safety Injection - Train B). Unattended step ladders was considered to be an example of poor

housekeeping. The preservation of equipment by painting was especially noteworthy, considering much of the plant equipment is exposed to a coastal environment.

c. Conclusions

Plant material condition observed during walkdowns was generally good. Preservation of equipment by painting was considered to be very good, considering the environment the plant is located in. One example of poor housekeeping (unattended step ladders) was observed in Unit 1 safety-related pump rooms.

M7 Quality Assurance in Maintenance Activities

M7.1 Licensee Self Assessment

a. Inspection Scope (62706)

The team reviewed an assessment of the licensee's implementation of the Rule conducted in December 1995, and an audit on Maintenance Rule compliance conducted in late July 1996. The inspector also held discussions with the Maintenance Rule Administrator, Quality Assurance personnel, and other licensee management.

b. Observations and Findings

The December 1995 assessment stated that the Maintenance Rule program did not meet the expectations of the Rule and related guidance. Several program areas were identified which needed additional attention. For example, the assessment team considered many performance criteria was inconsistent with industry norms, monitoring was not well defined, and limited progress had been made in developing other required program elements. After the assessment, St. Lucie took actions to bring their program more in line with industry standards. In addition, a new Maintenance Rule Administrator took over responsibility for the program.

The July 1996 audit of the program identified significant improvement in program implementation since December 1995. The program was now established in line with industry guidance and administrative procedures were in place. However, weaknesses remained in specific areas including the process for evaluation of the overall effect on performance of safety functions when taking equipment out of service. In addition, the audit identified weaknesses in procedural guidance, training of personnel, and integration of Maintenance Rule processes into the plant daily routine.

During this inspection, the team validated the licensee's audit weaknesses. Although several procedural guidelines had been instituted in August 1996, and a matrix was in place to evaluate taking risk significant equipment out of service, the team observed weaknesses that system engineers (system owners) currently exhibited during reviews discussed in sections M.6 and M.7.

c. Conclusions

The team concluded that the licensee's December 1995 assessment, and July 1996 audit, provided significant insight allowing corrective actions to be taken to institute an adequate program for compliance with 10 CFR 50.65. However, the inspection determined the program was not functioning well due in part to the short time it has been in place coupled with many new and inexperienced system engineers (system owners) who are not totally familiar with their systems or program requirements.

III. ENGINEERING

E2 Engineering Support of Facilities and Equipment

E2.1 Review of St. Lucie Predictive Maintenance Program (62706)

a. Inspection Scope (62706)

The inspector reviewed the licensee's predictive maintenance capabilities, toured the predictive maintenance facility, and discussed types of analysis with predictive maintenance supervision and other personnel.

b. Observations and Findings

The licensee used several analysis processes in the predictive maintenance program including, vibrational trending/analysis, lubrication analysis, thermography, bearing temperature trending, process parameter trending, and bearing failure analysis. The inspector toured the predictive maintenance facility and noted that the licensee had equipment to perform most analysis/testing in-house. In addition, the inspector noted the licensee was currently monitoring much of the plant equipment which could benefit from predictive analysis. The inspector particularly noted the licensee's bearing failure analysis program as being an area which should provide good failure analysis data.

c. Conclusions

The licensee's predictive maintenance program was being implemented in a manner which should provide the licensee with analysis results to focus on problems prior to equipment failure. This area was considered a strength.

E2.2 Review of Updated Final Safety Analysis Report (UFSAR) Commitments (62706)

A recent discovery of a licensee operating their facility in a manner contrary to the UFSAR description highlighted the need for a special focused review that compares plant practices, procedures and/or parameters to the UFSAR descriptions. While performing the inspections

discussed in this report, the inspectors reviewed the applicable portions of the UFSAR that related to the areas inspected. The inspectors verified that the UFSAR wording was consistent with the observed plant practices, procedures and/or parameters.

E4 Engineering Staff Knowledge and Performance

E4.1 Engineer Knowledge of the Maintenance Rule

a. Inspection Scope (62706)

The inspectors interviewed licensee system owners (system engineers) for the structures, systems, and/or components reviewed in paragraphs M1.6 and M1.7 to assess their understanding of the Maintenance Rule and associated responsibilities.

b. Observations and Findings

Some system engineers were knowledgeable of their systems, proactive in corrective actions, and actively participated in Rule development. Examples were the Emergency Diesel Generators, Reactor Coolant Pump Seals, Structures, and Turbine Cooling Water system engineers. Other system engineers for the remaining systems reviewed were newly assigned and lacked some system knowledge and historical information for their assigned systems. Although they understood specific requirements of the Maintenance Rule they did not always understand how to apply the rule to their systems. In many cases, performance criteria had been developed prior to their assignments.

The licensee had assigned nearly one half of the staff to the systems engineering organization within the last two months prior to this inspection. The design of the licensee's program for implementation of the Maintenance Rule is heavily dependent on systems engineers for implementation. As a result, the knowledge and experience of the newly assigned personnel was very limited. One exception to this observation was made involving the systems engineer for the Turbine Cooling Water System. This individual, in a month and a half, was already familiar with the issues on his assigned system, was in the process of initiating necessary corrective actions, and was very responsive to concerns raised by the NRC inspector.

c. Conclusions

Most of the system engineers interviewed were newly assigned and lacked some system knowledge and historical information for their assigned systems. Although they understood specific requirements of the Maintenance Rule they did not always understand how to apply the rule to their systems. The fact that the licensee assigned systems engineers so late in the process for implementation of the rule is viewed as the major contributing factor to the deficiencies noted during this inspection. Four system engineers were knowledgeable of their systems and implementing the Rule requirements in a good manner.

V. MANAGEMENT MEETINGS

X1 Exit Meeting Summary

The team leader discussed the progress of the inspection with licensee representatives on a daily basis and presented the results to members of licensee management at the conclusion of the inspection on September 20, 1996. The licensee acknowledged the findings presented.

The team leader asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

LICENSEE:

W. Bohlke, Engineering Vice President
D. Denver, Engineering Manager
J. Scarola, Plant General Manager
M. Snyder, Maintenance Rule Administrator
J. Stall, Site Vice President
M. Vincent, Engineer, Probablistic Safety Assessment
E. Weinkam, Licensing Manager
J. West, System Engineering Manager

NRC:

T. Bergman, Reactor Engineer, NRR
S. Black, Branch Chief, NRR
R. Correia, Section Chief, NRR
R. Frahm, Jr., Reactor Engineer, NRR
A. Gibson, Director, DRS
S. Iyde, Contractor, NRR
M. Miller, Senior Resident Inspector
J. Munday, Resident Inspector
D. Taylor, Resident Inspector

LIST OF INSPECTION PROCEDURES USED

IP 62706 Maintenance Rule

LIST OF ITEMS OPENED

50-335, 389/96-13-01	VIO	Failure to Include All Structures, Systems, and Components in the Scope of the Maintenance Rule as Required by 10 CFR 50.65 (b) (Section M1.1).
50-335, 389/96-13-02	VIO	Failure to Establish Performance Criteria Commensurate with Safety (Section M1.2).

LIST OF ITEMS OPENED
(cont'd)

50-335, 389/96-13-03	VIO	Failure to Follow Procedures for Implementation of the Maintenance Rule (Sections M1.6.b.3, M1.7.b.3, M1.7.b.6, and M1.7.b.7).
50-335, 389/96-13-04	IFI	Followup on Licensee Actions to Provide Performance Criteria for Structures After Industry Resolution of this Issue (Section M1.7.b.1).

LIST OF ACRONYMS USED

AFW	-	Auxiliary Feedwater
CDF	-	Core Damage Frequency
CEDM	-	Control Element Drive System
CEA	-	Control Element Assembly
CR	-	Condition Report
EDG	-	Emergency Diesel Generator
EOP	-	Emergency Operating Procedure
HVAC	-	Heating, Ventilation, and Air Conditioning
IFI	-	Inspector Followup Item
KV	-	Kilo-volt
LER	-	Licensee Event Report
MOV	-	Motor Operated Valve
MPFF	-	Maintenance Preventable Functional Failure
MRA	-	Maintenance Rule Administrator
NRC	-	Nuclear Regulatory Commission
NRR	-	Office of Nuclear Reactor Regulation
PM	-	Preventative Maintenance
PORV	-	Power Operated Relief Valve
PREMRA	-	Pre-evaluated Maintenance Risk Assessment
PRA	-	Probablistic Risk Assessment
PSA	-	Probablistic Safety Assessment
PSL	-	Plant St. Lucie
RCP	-	Reactor Coolant Pump
RCS	-	Reactor Coolant System
RPS	-	Reactor Protection System
RRW	-	Risk Reduction Worth
SSA	-	Shutdown Safety Assessment
SSC	-	Structures, Systems, and Components
TCB	-	Trip Circuit Breaker
TCW	-	Turbine Cooling Water
UFSAR	-	Updated Final Safety Analysis Report
VIO	-	Violation
WO	-	Work Order

LIST OF PROCEDURES REVIEWED

ADM 17.08, IMPLEMENTATION OF 10 CFR 50.65, THE MAINTENANCE RULE, Revisions 5 and 7

SCEG-003, GUIDELINE FOR THE CONDITION SURVEY OF STRUCTURES AND SUPPORTS BY PLANT PERSONNEL, Revision 1

SCEG-004, GUIDELINE FOR MAINTENANCE RULE SCOPING, RISK SIGNIFICANT DETERMINATION, AND EXPERT PANEL ACTIVITIES, Revision 0

SCEG-005, GUIDELINE FOR MAINTENANCE RULE PERFORMANCE CRITERIA DEVELOPMENT AND REVISION, Revision 0

SCEG-006, GUIDELINE FOR MONITORING MAINTENANCE EFFECTIVENESS BY MAINTENANCE RULE SYSTEM OWNERS, Revision 0

SCEG-007, GUIDELINE FOR PERFORMING CAUSE DETERMINATION AND MAINTENANCE RULE GOAL SETTING AND MONITORING ACTIVITIES, Revision 0

SCEG-008, GUIDELINE FOR MAINTENANCE RULE PERIODIC ASSESSMENTS, Revision 0

SCEG-009, GUIDELINE FOR MAINTENANCE RULE STRUCTURAL CONDITION MONITORING BY A QUALIFIED INSPECTOR, Revision 0

EOP-03, LOSS OF COOLANT ACCIDENT, Revision 14

EOP-04, STEAM GENERATOR TUBE RUPTURE, Revision 12

EOP-99, APPENDIXES/FIGURES/TABLES, Revision 17

ADMINISTRATIVE PROCEDURE NO. 0006130, CONDITION REPORTS, Revision 3

ADMINISTRATIVE PROCEDURE NO. 0010460, CRITICAL MAINTENANCE MANAGEMENT, Revision 7

ADM-08.04, ROOT CAUSE EVALUATIONS, Revision 3

ADM-0010432, CONTROL OF PLANT WORK ORDERS, Revision 4

OPERATING PROCEDURE NO. 0010129, EQUIPMENT OUT-OF-SERVICE, Revision 30

GUIDELINE No. OMG-003, WORK SCHEDULING AND COORDINATION, Revision 1

ADMINISTRATIVE PROCEDURE NO. 0005750, DUTIES AND RESPONSIBILITIES OF THE SYSTEM ENGINEER, Revision 4

ADM-17.03, OPERATING EXPERIENCE FEEDBACK, Revision 6

ADM 17.01, DUTIES AND RESPONSIBILITIES OF THE SHIFT TECHNICAL ADVISOR ADMINISTRATIVE PROCEDURE, Revision 13

PRE-EVALUATED MAINTENANCE RISK ASSESSMENT MATRIX, Revision 0

SCOPING DOCUMENT FOR THE IMPLEMENTATION OF THE MAINTENANCE RULE FOR MONITORING THE EFFECTIVENESS OF MAINTENANCE ON STRUCTURES, Revision 2

Calculation PSL-BFJR-96-007, Documentation of St. Lucie Pre-Evaluated Maintenance Rule Assessments, Revision 1

Calculation PSL-1FJR-94-002, Risk Significance Determinations of PSL Unit 1 Systems, Revision 0

Quarterly System Summary Report, Revision 1, July 5, 1996

July and August, 1996 Unit 1 & 2 Equipment Out of Service Logs

July and August, 1996 Unit 1 & 2 Chronological Logs

St. Lucie Plant

Implementation of

10 CFR 50.65

Maintenance Rule

INITIAL PROGRAM DEVELOPMENT 1993-1995

Lead Accountability with Failure Analysis Group

- **Maintenance Organization**
- **Overlay of existing processes at 'tail end'**
- **Program defined in a single procedure and 'Program Compliance Plan'**
- **Initial training provided**

System Scoping & Risk Significance Determination

- **NUMARC methodology used by Engineering to develop preliminary list**
- **In House PSA used to determine risk significance**
- **'Working Group' used to develop System Summaries**
- **Expert Panel used to approve Scoping, Risk, and System Summaries**

INITIAL PROGRAM DEVELOPMENT 1993-1995 (continued)

Performance Criteria, a(1) classification & Goal Setting

- **Performance Criteria: Availability, Reliability, Condition Monitoring**
- **Historical review performed by Maintenance Rule Coordinator**
- **a(1) classifications set by Maintenance Rule Coordinator**

Other influences on program

- **Early implementation for Emergency Diesel Generators under GL 94-01 (September '95)**
- **Site reorganization - System and Component Engineering (October '95)**
- **Maintenance Rule implementation accountability transferred to SCE (October '95)**

UTILITY SELF ASSESSMENT DECEMBER 1995

Quality Assurance Independent Technical Review 95-022 was a key turning point.

- **Lead Auditor technical exchange visits with Palo Verde and Diablo Canyon**
- **Use of an independent Maintenance Rule Technical Specialist**

Results

- **Scoping was adequate**
- **Performance Criteria selection was inadequate**
- **Historical Review needed to be performed again**
- **a(1) selections not valid, missing goal setting & monitoring**
- **Monitoring of Maintenance Preventable Functional Failures not consistent**

Recommendations

- **Implement the rule as a daily thought process through system engineers**
- **Dedicated efforts to implement rule required**

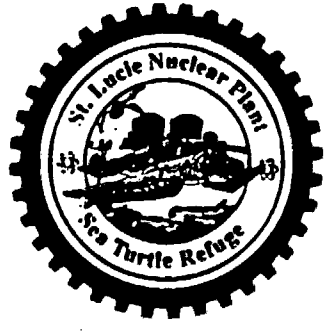
FINAL PROGRAM IMPLEMENTATION 1996

Bench marking and Self Assessments

- Technical exchange visits between Turkey Point and St. Lucie plant
- Programs elements from at least eight other plant sites were reviewed
- New MRule Administrator involvement in NEI conference & Limerick peer review
- Onsite NEI peer review
- MRule Engineer peer review at SONGs
- ERIN contract engineer staff augmentation
- System Engineering staffing comparisons

Project Organization

- Dedicated resources, including a QA Engineer, NPRDS technician
- Scope of work initially based on QA ITR recommendations
- Schedule additions based on subsequent Bench marking & self assessments
- Use of NUMARC 93-01; no exceptions taken
- Reestablished the Expert Panel at a different organizational level
- Identification of "System Owners"
- Greater role for Risk Assessment Engineer (Expert Panel member)
- Dedication of a Civil Engineer for structural program development



FINAL PROGRAM IMPLEMENTATION 1996 (continued)

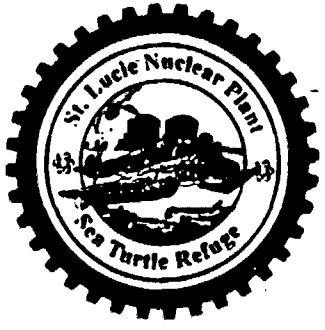
System Scoping & Risk Significance Determination

- **NUMARC methodology reapplied to develop final scoping matrix**
  - **8 Systems added**
  - **10 Structures added**

- **Conservative Risk Significant Classifications**
  - **PSA relied upon heavily to determine risk significance**
  - **When one of the risk criteria were met, the SSC was risk significant**
  - **Expert Panel downgraded one SSC (Turbine Building Switchgear HVAC)**
  - **Expert Panel added several SSCs to Risk Significant**
    - **Fuel & CEAs**
    - **Containment Vessel and penetrations**
    - **Shield Building**
    - **Containment Spray and Cooling Fans**

- **Expert Panel used to approve Scoping, Risk, and System Summaries**
  - **System Summaries developed / upgraded as necessary**

- **Results**
  - **133 Systems & Structures identified for review**
  - **83 Systems & Structures are in Scope**
  - **31 Systems & Structures are Risk Significant**



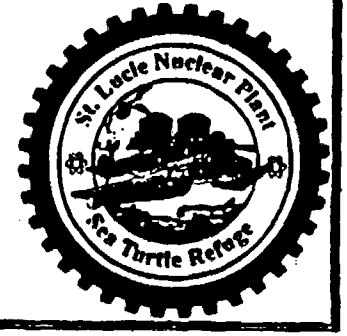
FINAL PROGRAM IMPLEMENTATION 1996 (continued)

Performance Criteria selection

- PSA sensitivity study for unavailability assumptions
- Historical review of unavailability and failures for risk significant systems
- Industry comparisons (e.g. Reliability, Conditions, SBO, INPO SSIs)
- Planned future maintenance activities

a(1) classification & Goal Setting

- Performance Criteria: Availability, Reliability, Condition Monitoring
- Historical review performed by project team & System Owners
- a(1) classifications recommended by MRule Administrator
- a(1) classifications approved by Expert Panel & System Owners
- Goal setting performed for a(1) SSCs
- Goals approved by Expert Panel



UTILITY SELF ASSESSMENT JULY 1996

Quality Assurance Audit 96-14

- **Lead Auditor continuity**
- **Use of an independent auditor from Turkey Point**

Results

- **Significant progress made since December**
- **Compliance with the rule achieved**
- **Improvement required in selected areas**

- **ACTION TAKEN ON ALL OF THESE IMPROVEMENT OPPORTUNITIES**

UTILITY SELF ASSESSMENT JULY 1996

Improvement opportunities in the areas of:

- **Risk Assessment for removal of equipment from service**
  - **Risk Matrix developed by site PSA engineer**
  - **13 week schedule implementation summer of 1996**
  - **Licensed Operators trained in Requal on Risk Matrix**
  - **Equipment Out Of Service Procedure revised**
  - **Use of Operations 'Real Time Training Coach'**
  - **Shutdown Safety Assessment match up with ORAM**

- **Level of detail in Procedural Guidance**
  - **ADM was made topical**
  - **6 additional guidelines for specific topics developed**
    - **Expert Panel activities**
    - **Performance Criteria Development**
    - **Monitoring Maintenance by System Owners**
    - **Cause determinations and Goal Setting**
    - **Periodic Assessments**
    - **Structural Monitoring**

UTILITY SELF ASSESSMENT JULY 1996

Improvement opportunities in the areas of: (continued)

- **Continuing training for Expert Panel and System Owners**
  - **Detailed Training Plan developed**
  - **Reorganization activities**
  - **New System Owners and Expert Panel members identified**
  - **Retraining / initial training provided**

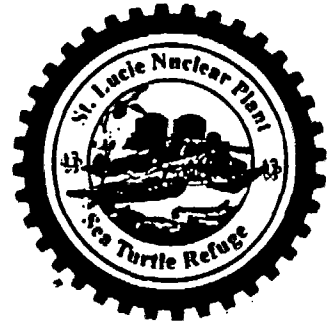
- **Programmatic tie of PSA updates to Maintenance Rule**
  - **PSA guidelines now include tie to Maintenance Rule**
  - **Maintenance Rule guidelines now include tie with PSA updates**

UTILITY SELF ASSESSMENT JULY 1996

Improvement opportunities in the areas of: (continued)

- **Documentation of historical review**
  - **Historical review files reassessed**
  - **Historical review files provided for new System Owner's use**

- **Periodic Assessment for EDGs**
  - **Early implementation of Maintenance Rule for EDGs**
  - **Used Guideline methodology for drafting Periodic Assessment**



BENEFITS REALIZED TO DATE FROM IMPLEMENTATION OF 10CFR50.65

- **Improved systematic program for monitoring condition of structures**

- **Systematic program for monitoring equipment performance**
  - **Utilizes PSA input to help focus management of system availability**
  - **Allows focus of resources for systems with failures**

- **Emergency Diesel Generators a(1)**
  - **Resources devoted to development of governor overhaul & tuning**
  - **Budget approval for upgrade of governor electronics (Industry Survey)**

- **Reactor Coolant Pump Seals a(1)**
  - **PM frequency adjustment**
  - **Systematic monitoring of the seal condition required**
  - **Budget approval for trial use of N9000 seal package (Industry Survey)**

- **Auxiliary Feedwater 1C train a(1)**
  - **Component level goals & monitoring**

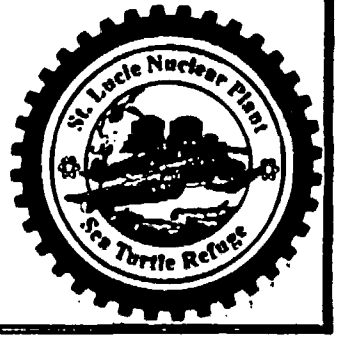
St. Lucie Nuclear Plant
Maintenance Rule

- **PSL MAINTENANCE RULE GOALS**
  - **Ensure SSCs that are important to nuclear safety:**
    - **Are properly scoped**
    - **Have the appropriate risk significance applied**
    - **Have performance criteria established**
    - **Are monitored for satisfactory performance**

- **HEIGHTEN SENSITIVITY TOWARDS EARLY IDENTIFICATION AND PROMPT CORRECTION OF PROBLEMS**

- **MONITOR THE EFFECTIVENESS OF MAINTENANCE**

- **INTEGRATE WITH EXISTING PLANT PROGRAMS AND PROCESSES**



St. Lucie Nuclear Plant
Maintenance Rule

- **MAINTENANCE RULE PROCEDURES AND GUIDELINES**

- **ADM 17.08, Implementation of 10CFR50.65, The Maintenance Rule**
  - **SCEG-003, Condition Survey of Structures and Supports by Plant Personnel**
  - **SCEG-004, Maintenance Rule Scoping, Risk Significant Determination, and Expert Panel Activities**
  - **SCEG-005, Maintenance Rule Performance Criteria Development and Revision**
  - **SCEG-006, Monitoring Maintenance Effectiveness by System Owners**
  - **SCEG-007, Performing Cause Determination and Maintenance Rule Goal Setting and Monitoring**
  - **SCEG-008, Maintenance Rule Periodic Assessments**
  - **SCEG-009, Maintenance Rule Structural Condition Monitoring by a Qualified Inspector**

St. Lucie Nuclear Plant
Maintenance Rule

- **INTEGRATION WITH EXISTING PSL PROGRAMS AND PROCESSES**

  - AP 0006130, Condition Reports
  - AP 0010460, Critical Maintenance Management
  - ADM 08.04, Root Cause Evaluations
  - ADM 0010432, Control of Plant Work Orders
  - OP 0010129, Equipment Out Of Service
  - OMG-003, Work Scheduling and Coordination
  - AP 0005750, Duties and Responsibilities of the System Engineer
  - Operations Logs
    - * RCO Chronological Log
    - * Data Loggers
  - ADM 17.03, Operating Assessment Feedback
  - QI 3/1, Design Control

St. Lucie Nuclear Plant
Maintenance Rule

- **EXPERT PANEL**

- Duties and responsibilities defined in ADM 17.08 and SCEG-004

*** Review and approve scoping and risk determinations**

*** Review, assess and approve Maintenance Rule program elements**

- Multi-disciplined team

*** System Engineering**	**Risk and Reliability Analysis**
Operations	**Maintenance(Mech, Elec, I&C)**
Work Control	**Plant Engineering**

- Experience and knowledge

*** 211 man years of nuclear power plant experience**

*** 171 man years of FPL nuclear experience**

*** Education: Nuclear, Electrical, Mechanical, Marine**

*** 3 SRO licenses, 4 STAs**

St. Lucie Nuclear Plant
Maintenance Rule

- **SYSTEM AND COMPONENT ENGINEERS**

- Prior to 5 Aug 1996

*** 8-System Engineers, 8-Component Engineers**

*** Engineers were overloaded**

- After 5 Aug 1996

*** 22-System Engineers, 8-Component Engineers**

*** Levelized system responsibilities**

*** Dedicated System Engineers for I&C systems**

*** Expanded System Engineers in Mechanical and Electrical**

*** MOV and AOV Component Engineer**

*** Cranes**

- Knowledge and Experience

*** 2 Senior Reactor Operator Licenses**

*** 12 Shift Technical Advisors**

*** 7 Professional Engineers**

*** 328 Years of Nuclear Experience**

*** 278 Years of PSL Experience**

St. Lucie Nuclear Plant
Maintenance Rule

• PSL Systems/Components in (a)(1)

Unit(s)	System, Structure	Failure	Corrective Actions	Status	Owner	Goals
1&2	Emergency Diesel Generator Governors	Repetitive MPFFs resulting in failure to carry load. Inadequate Preventive Maintenance on governors	1. Develop U1/U2 procedures to require periodic overhaul of governors. 2. Overhaul U2 governors 3. Overhaul U1 governors 4. No failures of governor and Stable load control.	Comp Comp Comp	Kulavich	1. No U1 governor actuator failures due to aging thru 12/96. 2. No U2 governor actuator failures Due to aging thru 7/96 3. Governor control stable while operating under load thru 12/96
1	1B2 Emergency Diesel Generator	Unavailability and reliability has exceeded performance criteria Of OOS hrs and Station Blackout triggers	1. Individual problems were verified to have addressed root cause. 2. For any additional start failures or OOS hrs, an ERT will be initiated	Comp 12/96	Kulavich	1. 12 month rolling total of OOS hrs to trend to less than 240 by 12/96 2. Less than 5 start failures per 100 start demands by 12/31/96
1&2	4.16 KV AC safety related breakers	Repetitive MPFFs due to floor tripper and latch check switch failures, which can be addressed by improved Preventive Maintenance for breakers.	1. Revise PM procedure for 4.16 kv breakers to improve reliability 2. Use PSA to prioritize PM Schedule 3. Notify training to review floor tripper and latch check problems with EM.	Comp Comp	Raldiris Ex Pnl	1. By 12/31/97,≤2 PMT failures U1 &U2 due to floor tripper or latch check. 2. No demand failures by 12/31/97 3. All 4.16 bkrs PM'd for floor trippers and latch check by 12/31/97.
1	PORVs	A MPFF resulted in PORV unavailability exceeding their performance criteria.	1. Improve testing steps in M-0037 2. Improve testing to ensure U1 Out solenoid &circuitry SAT prior to LTOP.	10/97 12/96	Sanders Snyder (PMAI)	1. 2 successful bench PMTs and inservice tests following the next PORV rebuild.

St. Lucie Nuclear Plant
Maintenance Rule

- PSL Systems/Components in (a)(1) (cont)

Unit(s)	System, Structure	failure	Corrective Actions	Status	Owner	Goals	
1	"C" AFW Train	Train unreliability has exceeded performance criteria for MPFFs	1. Upgrade the SMB-000 actuator PM to include as found/as left resistance check to ensure clean		10/9/96	Cook	1. No SMB-000 actuator PMT contactor failures after new PM implemented for 18 month period.
			2. Upgrade the U1 EGR PM to include resistance check for Proper inspection.		Comp	Wolaver	2. No as found out of spec EGR resistance checks for 18 months.
1&2	Reactor Coolant Pump Seals	Unplanned U1unavailability exceeded in 1995, in part due to failed 1A2 RCP seal.	1. Revise SU seal change out PM frequency to no more than 2 cycles.		11/96	Snyder	1. Monthly trend of all RCP seal stage pressures to show improved performance with shorter runs.
			2. SCE will evaluate 2nd cycle use of SU seals at each refueling.			Kelly	2. RCP seal change outs every other refueling cycle.
			3. Submit Request for Engineering Assistance for potential upgrade to more rugged N9000 seal design.		Comp	Kelly	

- SSCs currently under heightened awareness to improve equipment performance
  - Unit 1 ECCS HVAC dampers
  - Unit 2 Radiation Monitoring
  - Unit 1 and Unit 2 Control Element Drive Mechanisms
  - Unit 2 TCV 13-15, Hydrogen Cooler Temperature Control Valve
  - Unit 1 and Unit 2 MOVs with SMB-000 torque switches
  - Unit 1 and Unit 2 Main Transformers